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*LAURITRIOZA* N. GEN., FOR *TRIOZA ALACRIS*

(Homoptera Psylloidea)

**Abstract.** — The AA. describe *Lauritrioza* n. gen., with type species *Trioza alacris* Flor, 1861, which is now the only species of the genus; host plant *Laurus nobilis*. *Lauritrioza* is characterized by important primitive characters regarding morphology and biology of nymphs and adults; the following peculiarities are distinctive of the genus: 6 rhinaria, pointed sectasetae and lack of truncate sectasetae, shape of arolium, structure and position of anus and disposition of circum-anal pores in the nymph; presence of 6 rhinaria and inclined position of anus in the adult. Regarding *T. alacris*, the AA report complementary morphological notes on adult, egg and fifth-instar nymph, data on synonymy, host plant, life history, gall and distribution. It is recorded that M. Malpighi in 1679 described the gall of this species, in one of the first reports on *Psylloidea*. *L. alacris* has also a practical interest. The species, typical of the Mediterranean Basin, is now present, imported, throughout Europe and in N. and S. America. Forty-five illustrations are included.

**Riassunto.** — *Lauritrioza* n. gen., per *Trioza alacris* (Homoptera Psylloidea).

Gli Autori descrivono *Lauritrioza* n. gen., con specie tipo ed unica specie *Trioza alacris* Flor, 1861, del *Laurus nobilis*. *Lauritrioza* è distinto per importanti caratteri primitivi riguardanti morfologia e biologia di ninfe ed adulti; tra il resto peculiari sono nelle ninfe la presenza di 6 rinari, chetotassi a pointed sectasetae, senza truncate sectasetae, forma dell'arolio, struttura e posizione dell'ano e disposizione dei pori circumanali; nell'adulto la presenza di 6 rinari e la posizione inclinata all'innanzi dell'ano. Si riportano, al riguardo della *L. alacris*, note morfologiche complementari sull'adulto, l'uovo e la ninfa al V stadio, nonché dati su sinonimia, pianta nutrice primaria, biologia, galla e distribuzione. Si ricorda che già Malpighi nel 1679 descrisse la galla di questa specie, tra i primi Psilloidei menzionati dalla letteratura. *L. alacris* è importante anche dal lato pratico. La specie, tipica della Regione Mediterranea, è ora presente, introdotta, in tutta l'Europa ed anche in N. e S. America. Il lavoro è corredato da 45 figure di dettagli.

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## 1. Introduction.

*Trioza alacris* Flor, 1861 is a well known species at present with very wide distribution; the Laurel (*Laurus nobilis* L.) is its host plant. The Laurel is a Mediterranean tree or shrub cultivated as ornament in gardens, in parks and in greenhouses all over the world. *T. alacris* causes galls on the Laurel, rolling up the border of the leaves; these galls disfigure the plant and therefore the Psyllid has also a practical interest.

The literature regarding *T. alacris* is very wide, more than 150 works. The AA know more than 50 reports for Italy alone.

One of the first reports on Psylloidea, in the world, regards this species: Marcello MALPIGHI in his classic work « De Gallis », in « Anatomes Plantarum » (1679: 23) described a gall on the leaves of Laurel, which is exactly the one caused by *T. alacris*. See the number 3.7 (Appendix) and the work of MASSALONGO (1898: 28), not cited in psyllid literature.

Two of the very few studies on the symbiotic organ of Psylloidea regard *T. alacris* (SALFI 1928; TARSIA IN CURIA 1934). Also these works are not cited in literature, as far as we are aware.

*T. alacris* is a well known species, of sure determination, but it lacks a recent description of adult.

The nymphs of *T. alacris* are markedly differentiated from all the other nymphs of *Trioza* s.l.: in the very recent and valid work of WHITE & HODKINSON (1985: 212, 213, 267, 290, figs. 159) *T. alacris* is considered as a particularly isolated species of *Trioza*.

The careful examination of many specimens, nymphs and adults, has confirmed us that *T. alacris*, mostly for some peculiar nymphal characters, is to be placed in a separated genus, which we describe.

## 2. *Lauritrioza* n. gen.

*Type species: Trioza alacris* Flor, 1861.

*Characters: Lauritrioza* is characterized by the simultaneous occurrence of:

1) Regarding fifth-instar nymph: antennae (figs. 33-34) with 8 segments; 6 rhinaria, one on segments IV and VI, and four on segments VIII: the two terminal ones are very small; triangular arolium (figs. 35-36); ventral anus (figs. 28, 37) near the posterior border of the body, placed in a fold of the tegument and with a longitudinal opening;

perianal wax glands (fig. 38) in two zones: the outer area of circumanal pores is very wide, irregular and formed by many pores irregularly disposed; peculiar chaetotaxy (figs. 29-31): the truncate sectasetae are lacking and pointed sectasetae are present, and intercalated on the margin of the body by simple setae.

2) Regarding the adult, it is more difficult to indicate valid generic characters. We report: antennae short; 6 rhinaria, one on each one of IV, VI, VIII and IX segments, and two, very small, on X segment; the rhinarium of the IX segment has a large seta; forewing pointed, about three times as long as wide; vein *Rs* short, reaching the margin of the wing well before the bifurcation of the *M* vein; anal break far from the apex of *Cu*<sub>1</sub>, vein; metatibia with 2+1 saltatorial spines; proctiger of the male with the anus turned anteriorly, with a inclination of about 45° with the vertical axis of the proctiger; proctiger of the female with an anterior inclination.

3) Regarding the host plant and life history: *Lauritrioza* lives exclusively on *Lauraceae* family, during its whole cycle; eggs and nymphs remain in a gall formed by the rolled border of young leaves; therefore a peculiar life-history results.

*Species attributed*: only the type species. The other *Triozidae* living on the *Lauraceae* family, namely *Triozia camphorae* Sasaki, 1910, on *Cinnamomum camphora*, and *Triozia cinnamomi* (Boselli, 1930), on *Cinnamomum japonicum*, have different characters.

*Derivation of the name*: from *Laurus*, host plant, and *Triozia*.

### 3. *Lauritrioza alacris* (Flor, 1861).

#### 3.1. *Synonymies*

*Triozia alacris* Flor, 1861 (description: 398-400; in the keys: 380, 386, 393). Type locality: France, Marseille, Gemenos. Host plant: *Prunus laurocerasus* (erroneous indication). Typi: Naturhistorisches Museum, Wien.

*Triozia assimilis* Flor, 1861 (description: 408-409; in the keys: 384, 386). Type locality: as *T. alacris*. Host plant: not reported. Typus: Naturhistorisches Museum, Wien. Synonymy fixed by SULC (1913: 48), who examined a Typus ♀ and compared it with Types of *Triozia alacris*. KLIMASZEWSKI (1973: 259) in his Check-List still considers *T. assimilis*



as a separated species and reports only AULMANN 1913: probably the probative report of SULC escaped the attention of the Polish specialist.

*Trioza lauri* Targioni, 1879 (pag. 19) <sup>(1)</sup>. Type locality: Central Italy, Firenze. Host plant: *Laurus nobilis*. Typi: lost. Synonymy fixed by LOEW (1882: 241-242, 230) and universally accepted.

*Spanioza alacris* Flor - ENDERLEIN 1926: 400.

*Heterotrioza (Dyspersa) alacris* Flor - KLIMASZEWSKI 1968: 12.

### 3.2. Complementary morphological notes on the adult.

3.2.1. *Introduction.* The identification of *L. alacris* is very easy and it is not possible to mistake the species with other ones, in the European fauna. It is characteristic for the forewings long about three times than their length: only *Trioza portulacoides* has this character, but this species lacks genal cones, evident in *alacris*.

SULC published (1912: 49-52, pl. 32: 1-11) a good description, based on the Types; this description corresponds to our material. Following Authors added few data. We report other notices, concerning details which SULC did not consider, and we give also new figures.

Terminology and symbols follow HODKINSON & WHITE 1979.

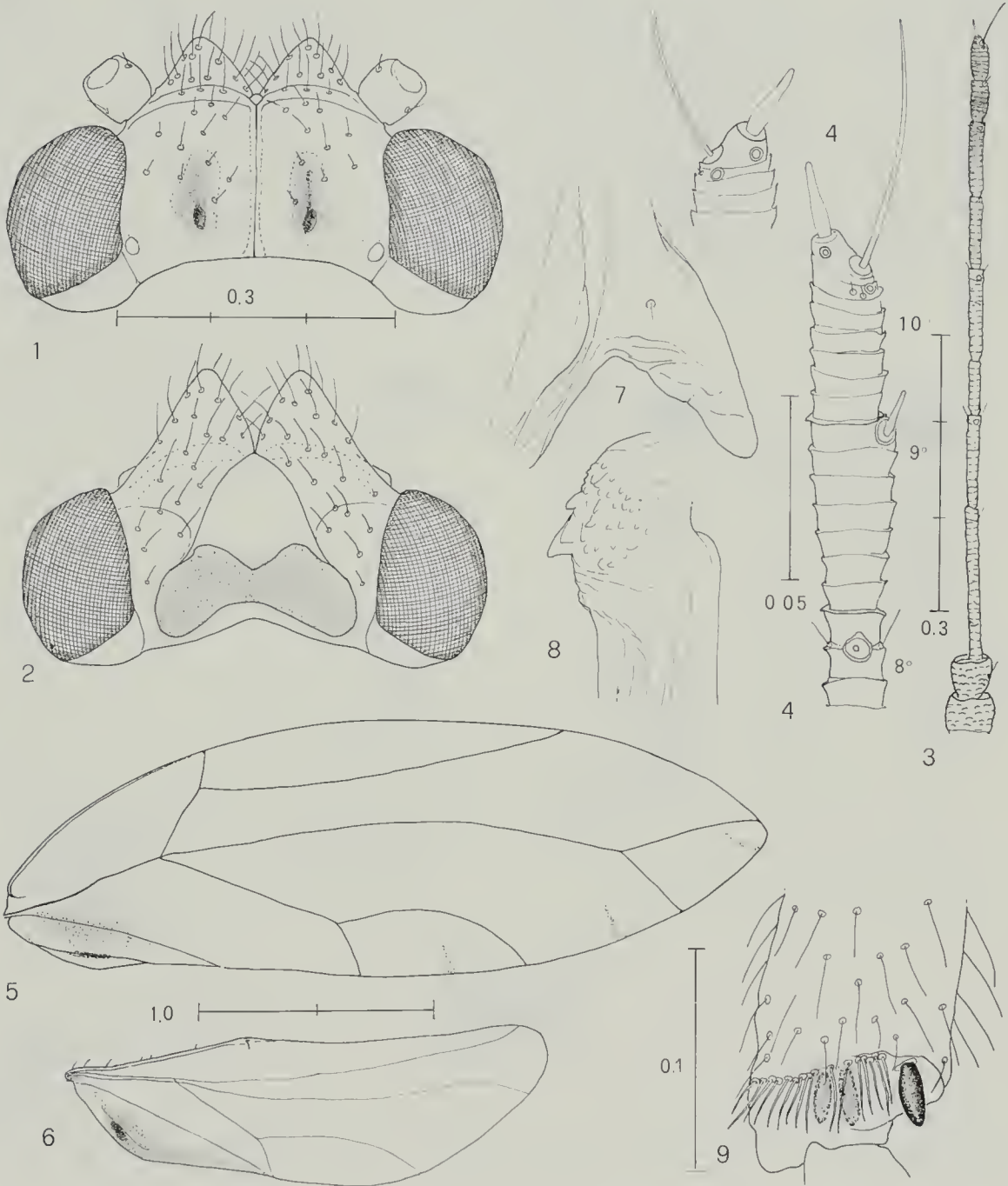
Both sexes are similar in morphology and colouration; they differ in terminalia; in living specimens the male has the I and V apparent tergites each one with a shining band of white wax; this is limited to a spot in the female; the wax is lost in dry material.

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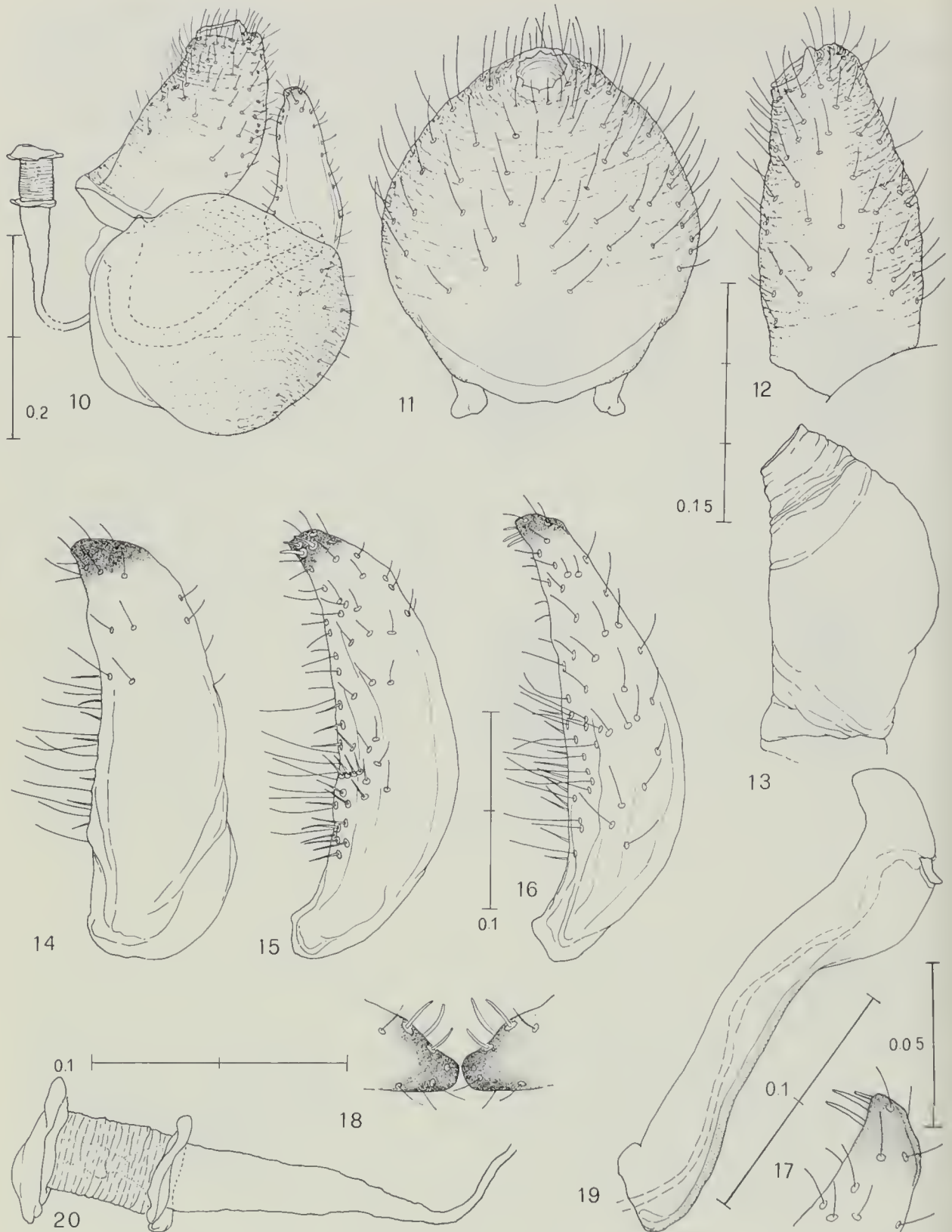
(1) The name *Trioza lauri* was published by TARGIONI (= Targioni Tozzetti A.) in 1879, as an introduction to an anatomic study, which he never published subsequently. In this note Targioni did not describe the species but the biological report of the galls on the leaves of *Laurus nobilis* replaces a diagnosis, because it fixes without doubt the individualization of the species. On the contrary, LOEW (1882: 241-242; 1886: 167) considered the name *lauri* taxonomically invalid, because without a description. TARGIONI-TOZZETTI (1888: 412-414, figs. 50 A-D) resumed the subject and gave a long description and 5 small figures, with the reference (pag. 413) as «*Trioza Lauri* Lichtenst.». Lichtenstein did not described the species, but in 1877 in Montpellier (France) he collected some galls with nymphs, which he sent to Löw (LOEW 1886: 166-167); Lichtenstein was in touch with Targioni Tozzetti, to whom he dedicate a new species (*Psylla Targionii*, now *Agonoscena*). Some subsequent Authors, especially in cecidiological and agrarian works, attributed *T. lauri* to Targioni, Lichtenstein, «*Hor.*»!

Our precisation is only theoretic, since the synonymy *L. alacris* (= *T. lauri*) is sure.

3.2.2. *Morphology*. Head (figs. 1-2). Vertex with two deep depressions; genal cones short, divergent at the base. Antennae (fig. 3) thin, short (about one time and half the width of the head). Six rhinaria (fig. 4), one on each segment IV, VI, VIII and IX, and two on segment X;



Figs. 1-9: *Lauritrioza alacris*, ♂, specimens from Trentino, Rovereto. — 1: head, upper view. - 2: head, below. - 3: antenna. - 4: terminal part of right and left antenna, upper view (8°, 9°, 10° = number of segments). - 5: forewing. - 6: hind wing. - 7: meracanthus. - 8: base of metatibia. - 9: apex of metatibia.



Figs. 10-20: *Lauritrioza alacris*, ♂, specimens from Trentino, Rovereto. — 10: genital-anal complex, lateral. — 11: proctiger, anterior surface. — 12: proctiger, lateral. — 13: idem, profile of another specimen. — 14: left paramere, outer. — 15: paramere, anterior. — 16: paramere, posterior. — 17: idem, higher magnification. — 18: apex of parameres, dorsal. — 19: penis. — 20: spermal pump.



the last ones, already cited by NGUYEN & BOUYJOU 1973, are very small and visible with difficulty; the rhinarium of the IX segment has a thick, obtuse hair.

Forewing (fig. 5) pointed, about three times as long as wide; wing apex lying in  $m_2$  cell, near  $M_{1+2}$  vein;  $R_s$  vein short, reaching the margin of the wing well before the bifurcation of M vein; anal break far from the apex of  $Cu_{1b}$  vein, well beyond the distal third of  $cu_{1b}$  cell;  $cu_1$  cell two times and half long as high. Microsculpture on the upper surface only in the anal zone, between the clavus and the margin of the wing; microsculpture of the lower surface only in the anal zone, a little wider; there are also three groups of radular spinules. A little brown spot is present on the anal vein. Hind wing (fig. 6) hyalin, with a brown spot, more or less dark, in the anal zone, where the microsculpture is

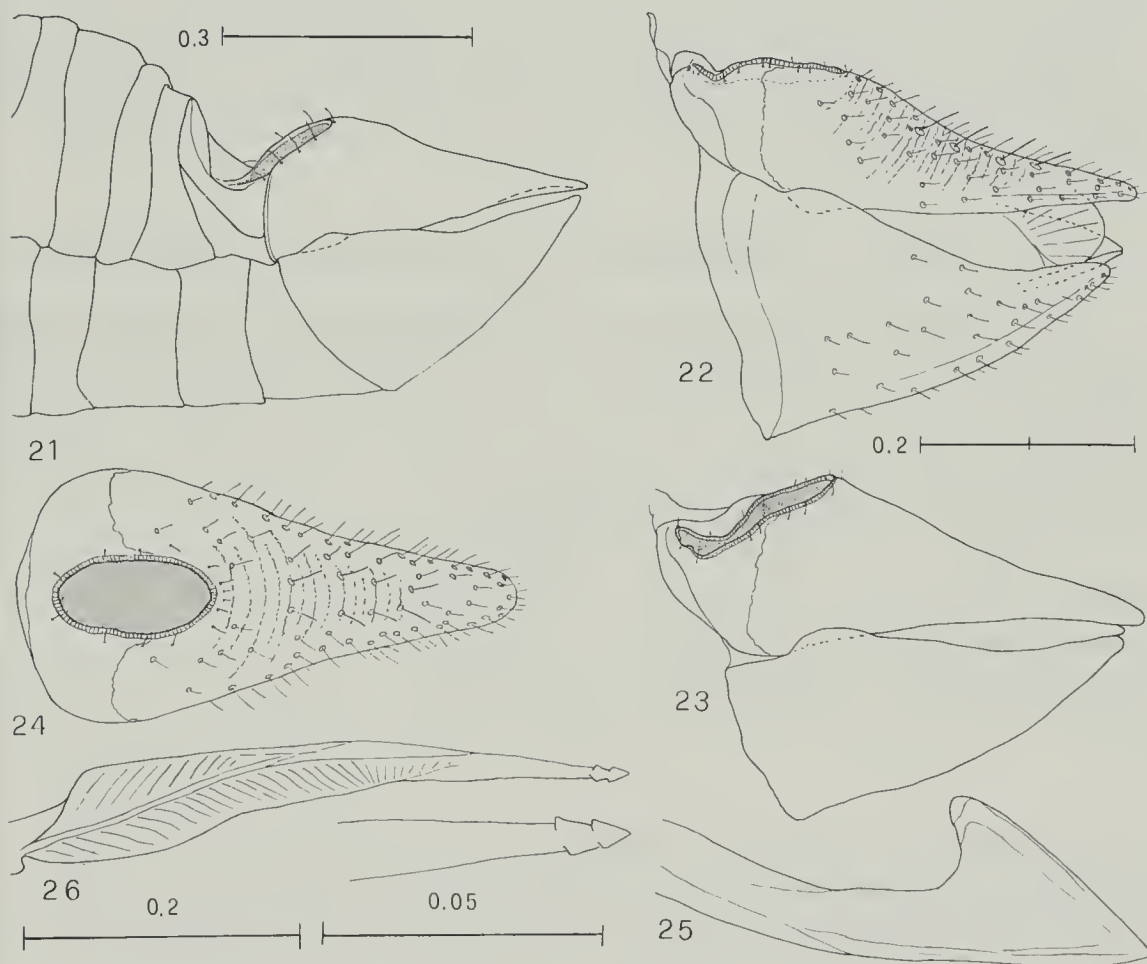


Fig. 21-26: *Lauritrioza alacris*, ♀, specimens from Trentino, Rovereto. — 21: genito-anal complex, lateral, dried specimen. - 22: idem, specimen in Faure liquid. - 23: idem, another specimen. - 24: genito-anal complex, dorsal. - 25: ovopositor. - 26: valvula, with different magnifications.

more evident than in the remaining wing. Hind leg with pointed meracanthus (fig. 7). Base of metatibia (fig. 8) wrinkled-dentate; apex of metatibia (fig. 9) with 2 + 1 black saltatorial spines and with 16-17 strong yellow hairs.

Male genito-anal complex (fig. 10) with the proctiger (figs. 11-13) variously convex and anus turned anteriorly, with an inclination of about 45° with the vertical axis of the proctiger. Parameres (figs. 14-18) simple; their apex with 2-3 spines directed forward; numerous and strong hairs on the inner surface. The last segment of the penis (fig. 19) shorter than the parameres. Spermal pump (fig. 20) with the two rings irregular and with narrow wings; a sclerified part is visible internally; the duct emerging out of the pump is conical and irregular.

Female genito-anal complex (figs. 21-24) with anus with a variable anterior inclination, less evident than in the male. In the mature overwintering specimens the tergite placed anteriorly of the genital complex has a flattening (almost a depression). Proctiger longer than high and with moderately long hairs and some rugosities in its median part. Ovipositor (fig. 25) with a wide triangular distal part; valvulae (fig. 26) with dentate apex.

3.2.3. *Colouration* corresponds to the description by SULC 1912.

3.2.4. *Principal measurements*. The measurements of numerous specimens give us the following data, in mm, which correspond to data by SULC:

total length (body + wings in resting position): ♂♂ 3.1-3.9; ♀♀ 3.5-4.0;  
 head width: ♂♂ 0.45-0.57; ♀♀ 0.50-0.53;  
 vertex width: ♂♂ 0.23-0.27; ♀♀ 0.25-0.27;  
 antennal length: ♂♂ 0.70-0.76; ♀♀ 0.71-0.78;  
 forewing length: ♂♂ 2.66-3.25; ♀♀ 3.02-3.33;  
 forewing width: ♂♂ 0.86-1.10; ♀♀ 1.01-1.10.

*Ratios:*

total length/head width: ♂♂ 6.89-7.57; ♀♀ 6.98-7.76;  
 antennal length/head width: ♂♂ 1.50-1.56; ♀♀ 1.46-1.53;  
 forewing length/forewing width: ♂♂ 2.88-3.32; ♀♀ 2.96-3.18.

3.3. *Complementary morphological notes on the preimaginal stages.*

The egg and the 5 nymphal stages were described by NGUYEN & BOUYJOU (1973: 994-1006, figs. 4-15) and by LOGINOVA (1968: 311-314,



figs. 60-65; 1979, fig. 172); the fifth-instar nymph was treated also by WHITE & HODKINSON (1982: 41, figs. 135, 150, 162).

3.3.1. *Egg* (figg. 40-42) oval, with pointed apex without a distinct micropyle; it has a strong basal-lateral pedicel. Length mm 0.22-0.25; diameter mm 0.12-0.14. Some eggs have a longer form, as in LOGINOVA's fig. 172 (1979). NGUYEN & BOUYJOU (1973, fig. 4) illustrate a egg more rounded than the specimens examined by us. The egg in BORELLI's fig. 3 is of an another insect.

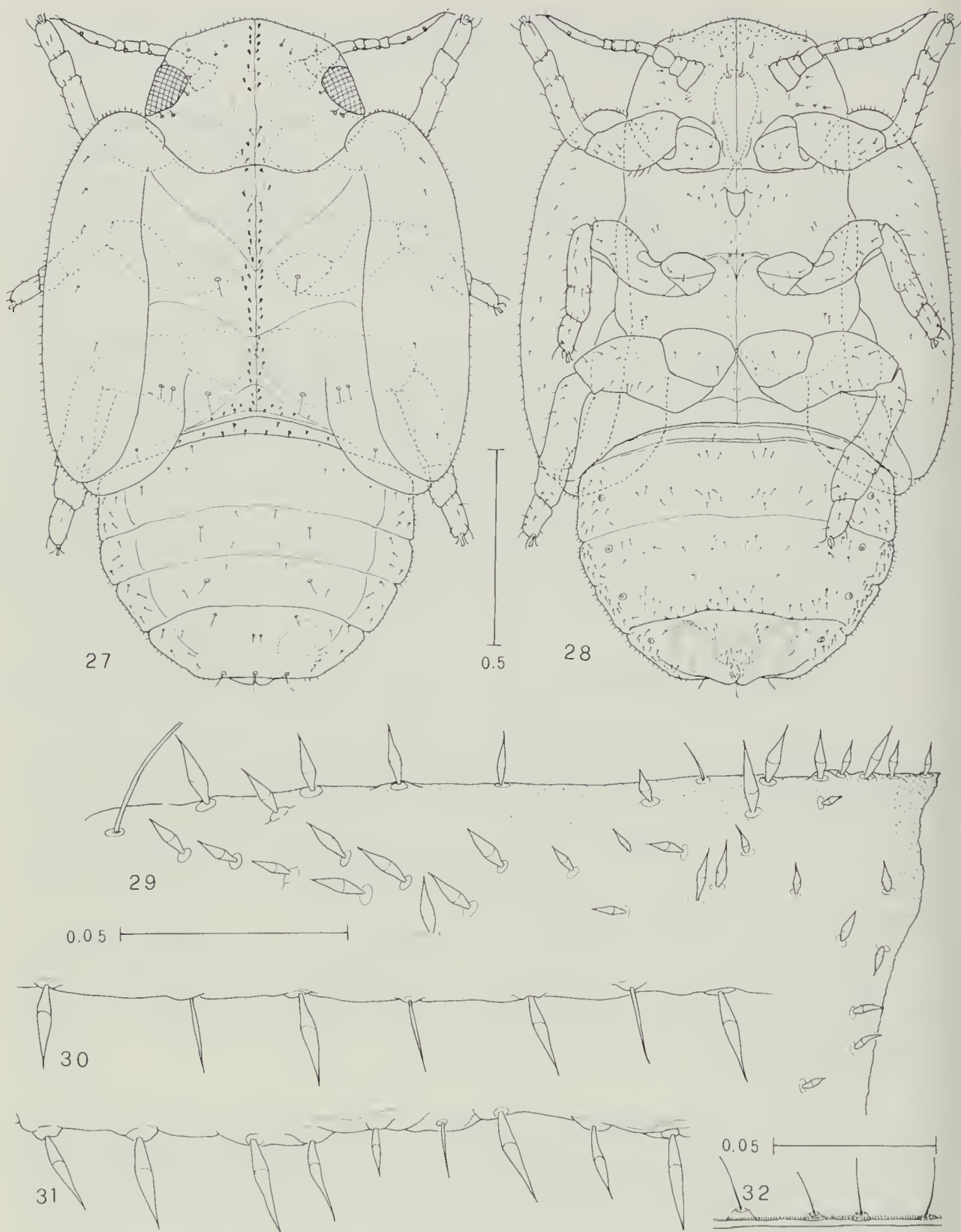
3.3.2. *Fifth-instar nymph* (figs. 27-39). Terminology after WHITE & HODKINSON 1982. Head rounded anteriorly. Eyes only dorsally visible. Antennae (figs. 33-34) with 8 segments; the last one includes the VIII-X segments of the adult. Four normal rhinaria on segments IV, VI and on the first and second third of VIII; two very small rhinaria (fig. 34) are present also on the apex of the VIII segment. There is also a sensorial organ with a truncate seta (fig. 34: S) between these two rhinaria.

Forewing-pad arrives to the posterior margin of the eye. Arolium (figs. 35-36) triangular, of a peculiar shape, with slightly concave apex. Anus (figs. 37-38) subterminal, ventral, with oval longitudinal opening; the anal opening is scarcely visible, because placed in a fold of the tegument. The wax circum-anal pores (figs. 28, 37, 38, 39) are disposed in two zones. The inner ring is U-shaped; it encircles partly the anus with two regular lines of pores laterally, but with irregular pores apically; anteriorly the inner ring of pores meets the outer complex of pores. The outer complex of circum-anal pores has the shape of two irregular sacks; it extends widely to the sides of the anus and it is formed by pores irregularly placed in several rows.

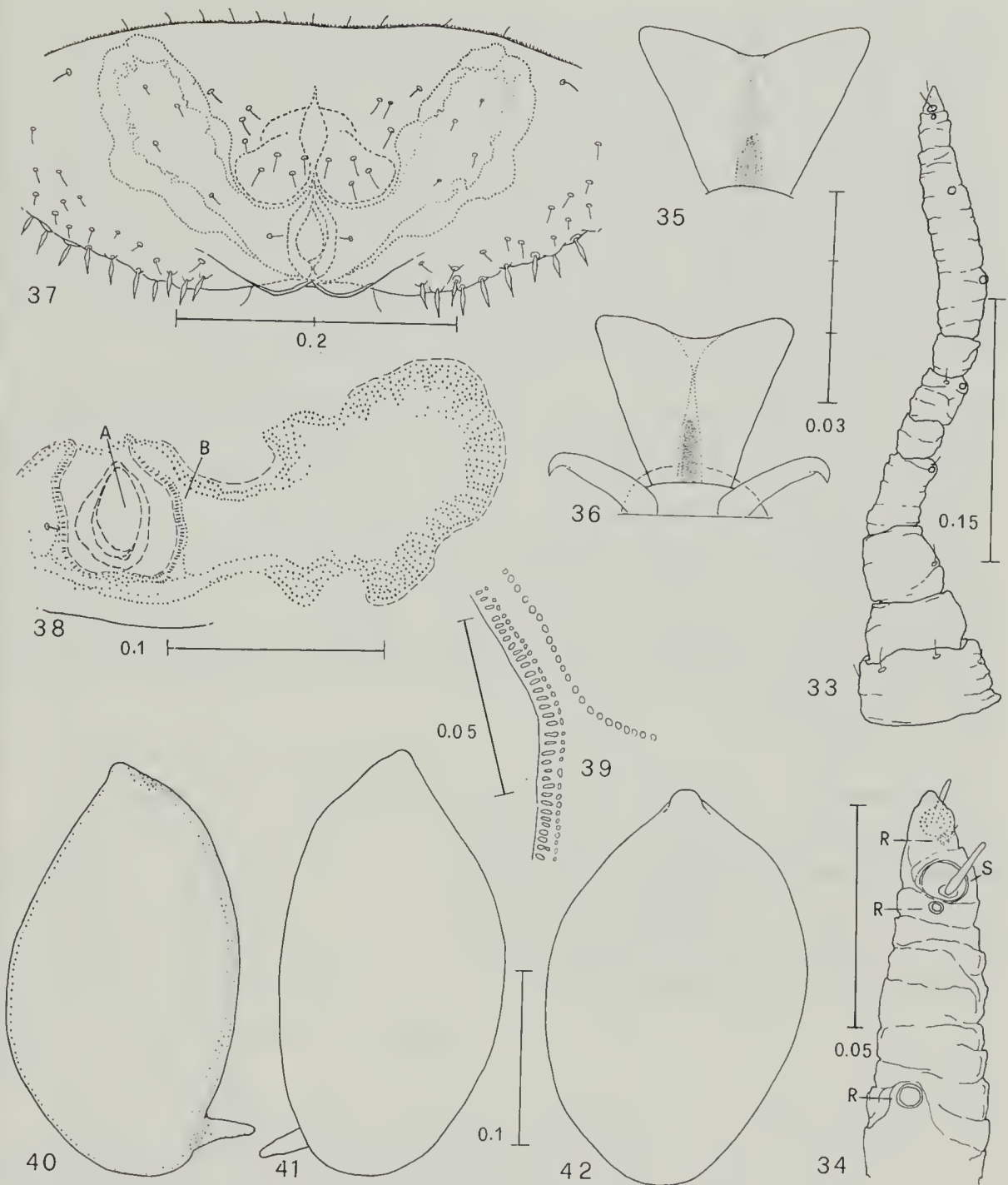
These characteristics of the apex of the abdomen, different from those of the other European *Trioza* s.l., are probably in relation with the life history of the nymph, which lives in a closed gall and therefore must have conditions of defecation different from the species that live free or in a open gall.

Chaetotaxy has peculiar characters. Body with thin hairs and two different kind of setae: pointed sectasetae, of various sizes, and simple setae, similar to normal hairs but straight and with stronger basal half. The truncate sectasetae, which are present in all European *Trioza* s.l. and form an important distinctive character of the genus, are completely lacking.

Pointed sectasetae on head (fig. 29) are present on its anterior margin, but are lacking near the eyes; they are also present, but smaller,



Figs. 27-32: *Lauritrioza alacris*, fifth-instar nymphs, specimens from Trentino, Rove-reto. — 27: nymph, dorsal, from an exuvia. — 28: nymph, ventral, from an exuvia. — 29: anterior head-margin and ventral sectasetae. — 30: forewing-pad margin sectasetae, of central zone. — 31: abdomen-margin sectasetae, of posterior half. — 32: anterior margin of the last sternite.



Figs. 33-39: *Lauritrioza alacris*, fifth-instar nymphs, specimens from Trentino, Rovereto. — 33: antenna. - 34: dorsal part of antenna (R = terminal rhinaria; S = sensorial structure). - 35: arolium. - 36: arolium with claws. - 37: abdomen, terminal part, ventral. - 38: wax gland complexes of anal region and anus (A), ventral. - 39: part of precedent figure, at B point, with higher magnification.

Figs. 40-42: *Lauritrioza alacris*, eggs in different positions.



on the lower surface of the head in a rhomboidal anterior zone. The head has almost exclusively pointed sectasetae. Pointed sectasetae on wing-pads (fig. 30) only on their lateral margin; generally they are a little longer than on the head and are intercalated with simple setae; in the central part of the anterior wing-pad they are alternate: one pointed sectasetae follows one simple seta, and so on; there are only pointed sectasetae at the base of wing-pads. Pointed sectasetae (fig. 31) disposed on the lateral margin of the abdomen are generally a little more variable than those on wing-pads; they are alternate with very few simple setae, which are shorter and similar to hairs. Terminal part of abdomen, near anus, lacks sectasetae: also this character is peculiar.

Dorsal surface of the body (fig. 27) with two longitudinal, central lines of pointed sectasetae on the head and on the thorax; also one transversal row of pointed sectasetae on posterior margin of metathorax and on anterior margin of abdomen. Ventral surface of the body (fig. 28) lacks pointed sectasetae, except head as noted above.

There are short and thin hairs in some zones. Anterior margin of the last sternite (fig. 32) with some hairs anteriorly directed and with a singular structure with very short, white hairs.

The number of setae (pointed sectasetae and simple setae) on each side of the mid-line, is:

- lateral margin of the head 13-15;
- lateral margin of forewing-pad 55-58;
- lateral margin of hind-wing pad 3-4;
- lateral margin of abdomen 41-46;
- central vertical line 26-30;
- transversal row of metathorax 6-7;
- transversal row of abdomen 4-5.

In the IV-I stages there is a number gradually decreasing of sectasetae.

Colouration. The I-IV stages are whitish and almost transparent in the slides in Faure liquid; the fifth instar is light yellowish, with antennae, legs and pointed sectasetae of the head a little darker; the nymph near to hatching has the genital part slightly coloured, so that it is possible to discern the sex.

Size, in mm: total length: 1.50-1.70; total width 0.95-1.07; antennal length: 0.35-0.43; forewing-pad length 0.79-0.94; abdominal length 0.53-0.87; abdominal width 0.68-0.81. For the size of I-IV instar, see NGUYEN & BOUYJOU (1973: 1001).

### 3.4. Host plant.

The normal and typical host plant of *L. alacris* is Laurel (*Laurus nobilis* L.), of the *Lauraceae* family, as it is almost always reported in the whole literature. Very few reports mention the similar *Laurus azoricus* (Seub.) J. Franco (*L. canariensis* Webb. & Berth.), but only for Canaries. FERRARI (1888: 77) reported that he obtained *alacris* from marginal galls on the leaves of « *Laurus camphora* » (now *Cinnamomum camphora* L. (= *Camphora officinarum* Nees) or *C. glanduliferum* Hook.) in the Doria Park in Genova-Nervi, 25.V.1887. This report needs confirmation, because it has not been checked again. There is also the report of *alacris* on *Persea indica* (L.) Sprengel (HODKINSON & WHITE 1979: 84).

*Prunus laurocerasus* cited as host plant by FLOR (1861: 400) in the original diagnosis, was never confirmed and certainly it is erroneous. The cause of this mistake by FLOR is probably due to the fact that in French *Laurus nobilis* is called « laurier (commun) » and *Prunus laurocerasus* « laurier-cerise ». Also in Italian *Laurus nobilis* is named « alloro » but also « lauro », and *Prunus laurocerasus* is called « lauroceraso » but also often « lauro ». Therefore, there is an homonymy in French and in Italian between these two plants slightly similar in their ornamental use. The northern entomologist Flor in Marseille might have noted the French name of « laurier », and afterwards he might have connected it erroneously with *Prunus laurocerasus*.

In our gardens in Rovereto (NE Italy) we do have *Laurus nobilis* infested with *L. alacris* close to plants of *Prunus laurocerasus*; we never observed, in several years of investigations, *L. alacris* staying on *Prunus laurocerasus* and, above all, producing its galls there.

*Prunus laurocerasus*, in our opinion, is to be rejected definitively as host plant of *L. alacris* and as a plant on which *L. alacris* can produce galls.

### 3.5. Life history.

The life history of *L. alacris* was examined by some Authors: the observations of BORELLI (1920) are particularly careful and the photographs of SAMPÒ (1977) are much demonstrative.

The number of generations per year is variable according to climatic factors: HODKINSON & WHITE (1979: 97) reported for England and Wales one or two generations, with a question mark; in Torino SAMPÒ (1977) observed two sure generations and a possible third one; near Bologna BORELLI (1920) controlled 5 generations, in breeding.

The adult overwinters on the same plant on which it developed in the summer months.

BORELLI observed the whole cycle of *L. lauri* near Bologna (N. Italy) during two years and reported the following data: the overwintered specimens mate in April and oviposit beginning from late April; the embryonal development lasts 6-8 days, if the season is favourable, and the postembryonal period lasts about twenty days; the period of the following generations is shorter during the summer: 18-20 days elapse in August from the oviposition to adult stage; the first nymphal stages last an average of 3 days each one and the fifth at least 5 days; these periods extend to 30 days in September and October. The adults of the first generation emerge about at the end of May; the adults of the fifth generation emerge about at the end of October and overwinter. The adult can live more than a month and therefore the generations overlap. The number of deposited eggs, also according BORELLI (1920), is 50-60 and more in the spring and summer generations, and 10-15 in the autumnal one.

We observed adults of *L. alacris* on a *Laurus nobilis* in Rovereto (Province of Trento, NE Italy), in Via Bellavista, on 270 m, during all the months of the year. HODKINSON & WHITE (1979: 87) report for Great Britain the presence of the adult on host plant in every month, except in June.

The adult is very lively and it corresponds very well to the specific name given to it by FLOR (*alacris*, in Latin = active). The vibratory movements of the body are characteristic, with quick swings of the posterior part of the abdomen.

*The gall* (fig. 43). The gall of *L. alacris* is well known and it was described and figured several times. We report in the fig. 43 the drawings of MASSALONGO (1893), which are among the best published.

The female oviposits near and along the margin of the lower surface of young leaves. Following BORELLI (1920: 17) « the female after the oviposition remains during all day near the eggs and drives repeatedly the rostrum into the tissue of the leaf. On the following day the characteristic leaf winding becomes apparent, and remains for about a week as a very thin roll, scarcely visible, and then it increase rapidly ».

Generally all the eggs of one gall are laid by a single female.

The roll of the leaf margin increases very rapidly after the hatching of the eggs and it reaches a conspicuous size. All the nymphs live in the gall. One gall contains normally nymphs of various stages, exuviae, dejections, small fragments and wax threads; everything is included in a sticky liquid. The mature fifth-instar nymph leaves the gall for emergence. The adult leaves on the leaf its nymphal exuvia, which is covered with an abundant wax secretion resembling a white flock.



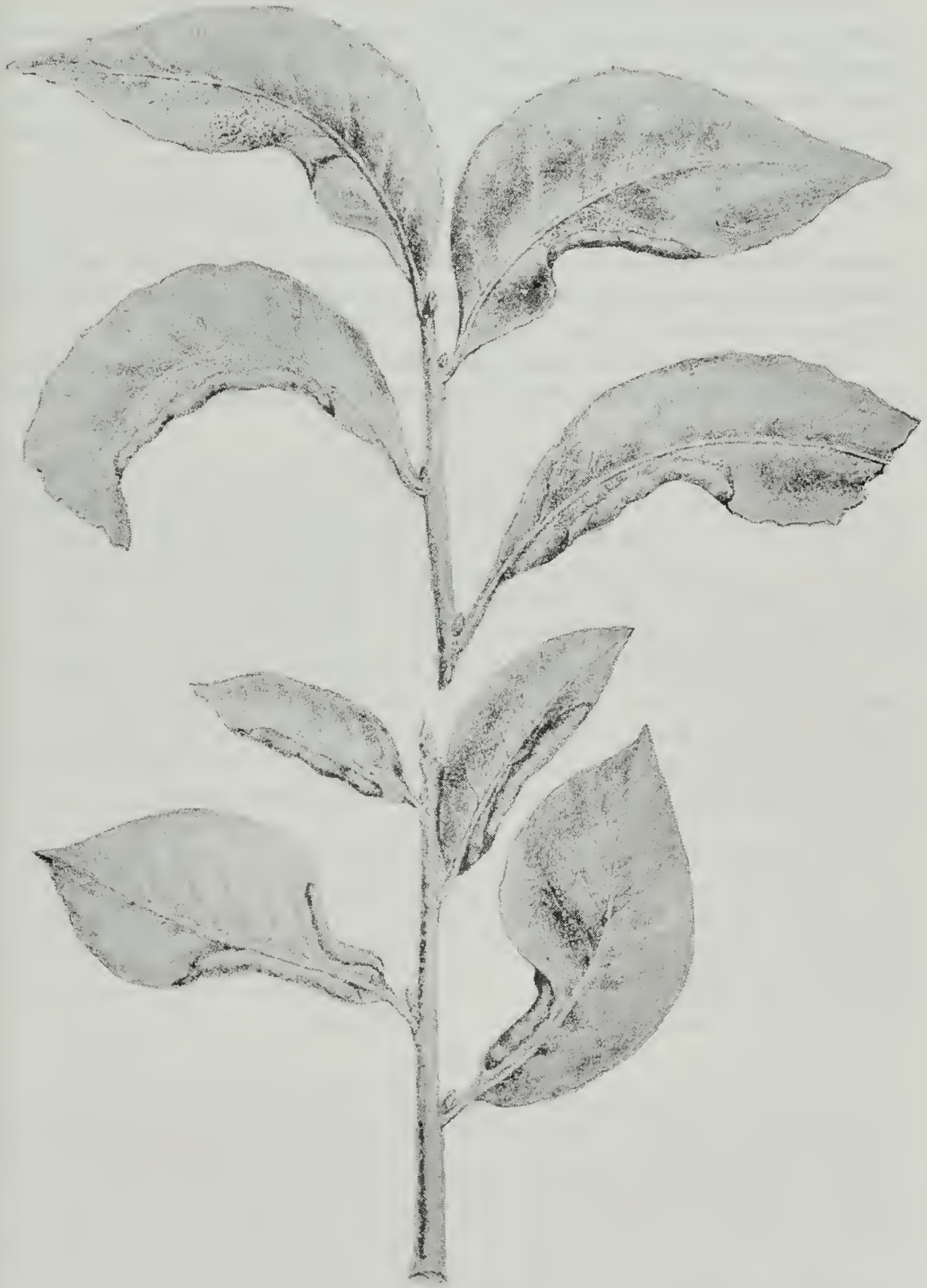


Fig. 43: *Lauritrioza alacris*, galls on leaves of *Laurus nobilis* (after MASSALONGO, 1893).

The completely developed gall is formed by a folding or rolling toward the lower surface of the leaf, which causes a tube with closed extremities as long as all the leaf or a part of it; the roll sometimes is broad till the median vein. The rolled part is decolorated, light green or yellowish; the tissues are strongly hypertrophied. The length of each gall is connected with the number of eggs; therefore the autumnal galls are generally remarkably shorter than those of spring and summer.

The leaf with a gall assumes a markedly anomalous aspect, often falcate. Rarely galls are present on both margins, and in such condition the leaf is completely deformed. Sometimes blister formations are evident on the upper surface of the leaf.

The galls dry and become black after the abandon of the nymphs: the damage is considerable to the aesthetics of the plant, if the infestation is massive.

*Parasites and predators.* BORELLI (1920: 25-35) found in the galls and treated widely *Anthocoris nemoralis* Fall. (*Heteroptera*), *Syrphus auricollis* Merg. (*Syrphidae*), *Psyllaephagus femoralis* n. sp. (*Chalcididae*, that she described), *Allotrombidium fuliginosum* Her. (*Trombididae*); she mentioned also *Pipizella heringi* Zell. (*Syrphidae*), *Actia pilipennis* Fall. (*Tachinidae*) and a larva of a Microlepidopterous.

LOGINOVA (1968: 314) mentions a Syrphid sp. and lists 5 species of predator *Coccinellidae*, but she did not find the latter in the galls: *Clitostethus arcuatus* Rossi, *Chilocorus bipustulatus* L. (nec *bipunctatus* L.), *Exochomus quadripustulatus* (nec *quadrimaculatus*) v. *floralis* Motsch., *Thea vigintiduopunctata* L. and *Propylaea quatuordecimpunctata* L.

We have not made specific observations but we have found in the galls larvae of a Syrphid and on the leaves some predators: *Anthocoris nemoralis* Fall. and *Nabis punctatus* Costa (*Heteroptera*), *Chilocorus bipustulatus* L., *Scymnus rubromaculatus* Goeze and *Nephus quadrimaculatus* Hbst. (*Coccinellidae*).

### 3.6. *Distribution.*

*L. alacris* is known almost throughout the whole Mediterranean Basin, where *Laurus nobilis* is endemic; it has been also widely introduced in Europe, on frequently cultivated Laurels, in nurseries, greenhouses, gardens and parks. The literature cites this Psyllid from Canaries and Portugal to Crimea (northwards to N. Wales, S. Sweden and S. Finland), N. Africa, Anatolia and Caucasus. The species was introduced in U.S.A. (California and New Jersey), Chile, Argentina and Brasil, always on Laurel.

*L. alacris* is a common and widespread species in Italy, known in almost all Regions, included Sicilia and Sardegna; reports are lacking for Alto Adige. We found it common in many localities between 10 and 400 m, in all the months, on *Laurus nobilis* and sometimes on other nearby plants.

3.7. *Appendix. L. alacris in « De Gallis » by M. Malpighi (1679).*

The first part of the very famous work « Anatomie Plantarum » (= Anatomy of plants) by Marcello MALPIGHI (Crevalcore near Bologna 10.III.1628 - Roma 19.XI.1694) was published in Latin in London in 1675, Impensis Johannis Martyn, Regiae Societatis Typographi (4 + 82 + 20 pages; 54 + 7 pls.). The « Anatomies [sic] Plantarum Pars altera » (= second part) (fig. 44) was published by the same Typographer and is dated 1679 (4 + 94 + 2 pages; 39 pls.). This work is very rare. We examined a copy of it, in which the two parts are bound together with an ancient binding in parchment; we think that in other copies the two parts of the same work are separated.

The « Pars altera » includes some chapters; after « De Seminum Vegetatione », « De Gallis » follows, which is developed in pages 22-50, with figures 7-74, included in plates VI-XXI. Other subjects follow this part.

« De Gallis » is considered the most ancient treatise of cecidology of the world and Marcello Malpighi is considered as the founder of this science. Many galls are here described (critically examined in MASSALONGO 1898), but, regarding the *Psylloidea*, there is only a mention of the gall on *Laurus* leaves, reported on page 23, lines 29-36, which the Author examined together also with similar galls on a *Quercus* (these last ones are caused by the Dipteran *Macrodiplosis dryobia*, according to MASSALONGO 1898).

In fig. 45 we report this part of the original paragraph by MALPIGHI 1679. The English translation is: « Some issues of Insects are protected and nourished in a wonderful way, with a less waste for the plant. We observed that sometimes the leaves are modified from the primitive form in the Laurel and in the Oak (fig. 8). But these leaves still vegetate and fold their margins toward the lower surface (fig. 8: A) protecting the issues of these insects. Meantime the folded part of the leaf becomes more inflated and decolorated with turgid series of little blisters. Sometimes the whole surface of the leaf increased bent in order to incubate the eggs ».

The « Anatomie Plantarum » was reprinted in London in 1686 in the « Opera Omnia » by M. MALPIGHI, two volumes; in this edition the chapter



MARCELLI MALPIGHII  
 Philosophi & Medici Bononiensis,  
 E  
 REGIA SOCIETATE,  
 ANATOMES  
 PLANTARUM  
 PARS ALTERA.

REGIÆ SOCIETATI,  
*Londini* ad Scientiam Naturalem promovendam  
 institutæ, dicata.



LONDINI,  
 Impensis *Johannis Martyn*, Regiæ Societatis Typographi, ad insigne Cam-  
 panæ in Cœmeterio *Divi Pauli*, MDCLXXIX.

Fig. 44: Frontispiece of the work «Anatomes Plantarum Pars altera», 1679, by M. MALPIGHI.

« De Gallis » is found at pages 17-38, and the reference to the galls of *Laurus* and *Quercus* leaves is in page 18, lines 23-29 (not seen).

The same « Anatomie Plantarum » was subsequently reprinted in the « Opera omnia » by M. MALPIGHI, Lugduni Batavorum (= Leiden), apud Petrum Valder Aa, Bibliopolam, 170 and 379 pages + pages n.n., with

Minori plantarum dispendio, infectorum quidam foetus mirè foventur; ut passim in *Lauro*, & *Quercu* ipsa (8.) intuemur; cujus folia, licèt interdum à primæva deturbentur forma; adhuc tamen vegetare non desinunt, & reflexis denticulatis apicibus *A* versùs folii partem terram spectantem, ejectos foetus fovent. Reflexa interea folii portio, turgentibus utriculorum seriebus, crassior redditur, & decolor. In aliquibus tota folii latitudo, pro incubandis ovis curvata, subcrevit. Ità (9.) in *Perforatæ*, &

Fig. 45: Reproduction from the original by M. MALPIGHI, 1679, « Anatomies Plantarum Pars altera »: page 23, lines 29-36, with the reference to the galls on the leaves of *Laurus*.

the figures of the original plates arranged in different position; in this edition « De Gallis » appears in pages 112-132 and the reference to the galls of *Laurus* and *Quercus* leaves is in page 113, lines 15-20, cited with the same words as in the edition of 1679.

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#### CITED REFERENCES

- BORELLI N., 1920 (1919) - Contributo alla conoscenza della vita nelle galle dell'alloro - *Bull. Soc. ent. ital.* Firenze, 51: 3-37, 7 figs.  
 ENDERLEIN G., 1926 - Psyllidologica VIII - *Ent. Mitt.*, Berlin-Dahlem, 15 (5-6): 397-401.  
 FERRARI P. M., 1888 - Psillide raccolte in Liguria - *Annali Museo civ. Stor. nat. Genova*, 26: 74-77.  
 FLOR G., 1861 - Zur Kenntniss der Rhynchoten etc. - *Bull. Soc. imp. Nat. Moscou*, 34 I (2): 331-422.

- HODKINSON I. D. & WHITE I. M., 1979 - Homoptera Psylloidea - Handbooks Ident. Br. Insects, *R. ent. Soc., London*, 2 (5a): 1-98, 321 figs.
- KLIMASZEWSKI S. M., 1968 (1967) - Relations de parenté des espèces du genre *Trioza* Först. de l'Europe centrale etc. - *Annales Univ. M. Curie-Sklodowska*, Lublin, Sectio C, 22 (1): 1-20, 2 tab. f.t. (in Polish).
- KLIMASZEWSKI S. M., 1973 - The Jumping Plant Lice or Psyllids of the Palaearctic. An annotated Check-List - *Annales zool.*, Warszawa, 30 (7): 155-286.
- LOEW F., 1882 - Revision der paläarktischen Psylloden in Hinsicht auf Systematik und Synonymie - *Verh. zool.-bot. Ges. Wien*, 32 (1): 227-254.
- LOEW F., 1886 - Neue Beiträge zur Kenntniss der Psylliden - *Verh. zool.-bot. Ges. Wien*, 36: 149-170, tav. VI.
- LOGINOVA M. M., 1968 - [New data on the fauna and biology of the Caucasian Psylloidea] - *Trudy vses. ent. Obshek.*, Moskva-Leningrad, 52: 275-328, 74 figs. (in Russian).
- LOGINOVA M. M., 1979 - [Eggs of the Psylloidea, use peculiarities of their morphology in Systematics of these insects] - *Trudy Zool. Inst. Akad. Nauk CCCP*, Leningrad, 82: 23-39, 192 figs.
- MALPIGHI M., 1675 - Anatomie Plantarum - *Impensis Johannis Martyn*, Londini: 4 + 82 + 20; 54 + 7 pls.
- MALPIGHI M., 1679 - Anatomes Plantarum Pars altera - *Impensis Johannis Martyn*, Londini: 4 + 94 + 2, 39 pls.
- MASSALONGO C. B., 1893 - Le galle nella Flora italica (Entomocecidii) - *Memorie Accad. Agric. Arti Comm., Verona*, Serie III, 69 (1): 227-527, 40 pls.
- MASSALONGO C., 1898 - Le galle nell'Anatome plantarum di M. Malpighi - *Malpighia*, Genova, 12: 20-58.
- NGUYEN T. X. & BOUYJOU B., 1973 - Contribution à la connaissance des Psyllides de France. 1. Etude morphologique des différents stades de *Trioza alacris* - *Annales Soc. ent. Fr.*, Paris, N.S., 9 (4): 989-1007, 18 figs, 3 tab.
- SALFI M., 1928 - L'organo simbiotico di *Trioza alacris* Flor - *Monitore zool. ital.*, Siena, 39: 21-22.
- SAMPÒ A., 1977 - La Psilla del Lauro (*Trioza alacris* Flor) - *Il Floricultore*, Milano, 14 (1): 79, 81-83, 9 figs.
- SULC K., 1912 - Monographia generis *Trioza* Foerster. Pars III - *Sitz. kön. böhm. Ges. Wiss. mat. nat. Cl.*, Prag, 16: 1-63, pl. XXI-XXXV.
- SULC K., 1913 - Idem, Pars IV - Idem: 1-48, pl. XXXVI-XLVIII.
- TARGIONI [TOZZETTI A.], 1879 - [*Trioza lauri*, note anatomiche, specialmente sugli organi genitali] - *Resoconti Adunanze, Suppl. Bull. Soc. ent. ital.*, Firenze, 11: 19-20.
- TARGIONI TOZZETTI A., 1888 - Relazione intorno ai lavori della R. Stazione di Entomologia Agraria di Firenze per gli anni 1883-84-85 - *Annali Agricoltura*, Firenze: VIII+533, figs.
- TARSIA IN CURIA I., 1934 - La simbiosi ereditaria in *Trioza alacris* Flor - *Archivio zool. ital.*, Torino, 20: 215-235, 4 figs, pls. 6, 7.
- WHITE I. M. & HODKINSON I. D., 1982 - Psylloidea (Nymphal Stages) - Handbooks Ident. Br. Insects, *R. ent. Soc. London*, 2, Part 5(b): 1-49, 174 figs.
- WHITE I. M. & HODKINSON I. D., 1985 - Nymphal taxonomy and systematics of the Psylloidea - *Bull. Br. Mus. nat. Hist., Entom.*, London, 50 (2): 153-301, 201 figs.